UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

December 2, 2019

Mr. Robert Craven
Site Director
NexEra Energy Point Beach, LLC
6610 Nuclear Road
Two Rivers, WI 54241-9516

SUBJECT: POINT BEACH NUCLEAR PLANT – NRC INSPECTION OF TEMPORARY INSTRUCTION 2515/194, INSPECTION OF THE LICENSEE'S IMPLEMENTATION OF INDUSTRY INITIATIVE ASSOCIATED WITH THE OPEN PHASE CONDITION DESIGN VULNERABILITIES IN ELECTRIC POWER SYSTEMS (NRC BULLETIN 2012-01) REPORT 05000266/2019011 AND 05000301/2019011

Dear Mr. Craven:

On October 30, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Point Beach Nuclear Plant and discussed the results of this inspection with James Wilson, Operations Director and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Robert C. Daley, Chief
Engineering Branch 3
Division of Reactor Safety

Docket Nos. 05000266 and 05000301
License Nos. DPR-24 and DPR-27

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

Letter to Robert Craven from Robert C. Daley dated December 2, 2019.

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000266 and 05000301
License Numbers:	DPR-24 and DPR-27
Report Numbers:	05000266/2019011 and 05000301/2019011
Enterprise Identifier:	I-2019-011-0042
Licensee:	NexEra Energy Point Beach, LLC
Facility:	Point Beach Nuclear Plant
Location:	Two Rivers, WI
Inspection Dates:	October 28, 2019 to October 30, 2019
Inspector:	A. Dahbur, Senior Reactor Inspector
Approved By:	Robert C. Daley, Chief Engineering Branch 3 Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a NRC Inspection of Temporary Instruction 2515/194, Inspection of The Licensee's Implementation of Industry Initiative Associated With The Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01) at Point Beach Nuclear Plant, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

No findings or violations of more than minor significance were identified.

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspector reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

2515/194 - Inspection of the Licensee's Implementation of Industry Initiative Associated With the Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01)

The inspector reviewed the licensee's implementation of the "Nuclear Energy Institute Voluntary Industry Initiative," (ADAMS Accession No. ML15075A454) dated March 16, 2015.

The objective of Temporary Instruction 2515/194 is to verify that licensees have appropriately implemented the Nuclear Energy Institute voluntary industry initiative (ADAMS Accession No. ML15075A454), dated March 16, 2015, including updating their licensing basis to reflect the need to protect against open phase conditions (OPCs). The inspector discussed the impacts of OPCs on the licensee's electrical system design, the ability to detect and alarm OPCs on station transformers, and ongoing implementation of training and updates to operating procedures with plant staff. The inspector reviewed licensee and vendor documentation, and performed system walkdowns to verify that the installed equipment was supported by the design documentation. The inspector verified that the licensee had completed the installation and testing of equipment (with the exception of the tripping functions), installed and tested alarming circuits both locally and in the control room, and analyzed potential impacts associated with the design implementation on the current licensing basis. The inspector also reviewed licensee analysis and calculations, and performed distribution system equipment walkdowns.

The inspector performed Section 03.01 of the Temporary Instruction in order to determination whether the licensee appropriately implemented the voluntary industry initiative, dated March 16, 2015 (ADAMS Accession No. ML15075A454). This included reviewing how the licensee updated their licensing basis to reflect the need to protect against open phase conditions.

(1) The normal offsite power supply for safeguards equipment is supplied from the 345 KV AC transmission system via the High Voltage Auxiliary Transformers (HVAT) (345 KV /13.8 KV) 1X-03 and 2X-03 which provide the interface to the 13.8 KV Low Voltage Auxiliary Transformers (13.8 KV/4.16 KV) 1X-04 and 2X-04 for Unit 1 and Unit 2, respectively. Under some conditions, if the normal offsite power supply was not available, safeguards equipment can also be supplied from offsite power by back feeding through the Main Transformers 1X-01 and 2X-01 for Unit 1 and Unit 2, respectively.

Point Beach Nuclear Plant adopted General Electric's (GE) Compact Optical Sensor Intelligence (COSI) technology to address and implement a detection and protection scheme for open phase conditions. Point Beach Nuclear Plant implemented the open phase project in multiple phases.

Phase I:

Installed Fiber Optic Current Transformers (FOCT) on Main Transformers 1X-01, 2X-01 and High Voltage Station Auxiliary Transformers 1X-03 and 2X-03 as the first stage of the Open Phase project. The installation included installing the FOCT rings on the high voltage bushings of each transformer, installing Cable Management Boxes (CMB) near the transformers, and routing the FOCT cables to the associated CMB. Phase I was completed in October 2017.

Phase II:

This portion of the open phase project installed the Open Phase Detection System (OPDS) in COSI Panels 1C-343, 1C-344, 2C-343, and 2C-344, for 1X-01, 1X-03, 2X-01 and 2X-03, respectively. Each COSI Relay Cabinet contained the COSI units, protective relays, and indication and control subpanels. Each single COSI MU CT chassis receives one fiber optic coil each from Phase A, Phase B and Phase C. The fourth fiber optic coil on each CT is spare A two out of three logic scheme will be used to signal a loss of that phase of power to a relay. The relays will provide an alarm / trip function in such a way as to energize to actuate (not fail safe). COSI/Relay was supplied fully prewired and tested by the vendor.

Phase II was completed in December 2017 and made the system operational, and entered a monitoring period, with no automatic protective actions in place.

Point Beach Nuclear Plant determined based on MPR Calculation 0292-0056-CALC-005 that the trip function for the open phase was not required and would not be activated. The calculation demonstrated that existing plant protective devices (Loss of Voltage relays, LOV; Degraded Voltage relays, DVR; and Neutral Over-current, 51N relays) will ensure that the station is isolated from an Open Phase event that could cause unacceptable voltage imbalances and does it prior to safeguards equipment tripping on over current provided several changes which would be implemented in Phase III.

Phase III:

This portion of the open phase project will implement the open phase detection system and incorporate into the station design basis. This includes implementing the final setting for the open phase equipment and enabling the applicable alarms.

The following modifications were scheduled to be implemented per phase III:

- Tie-in the open phase detection and alarm system to the plant alarm circuit in the control room. The "Open Phase Detected" alarms will notify operations of a possible open phase condition. The "Open Phase Trouble" alarms will notify operations of issues with the OPDP cabinets and equipment. (completed)

- Replace existing 1-51N/X03 and 2-51N/X03 CO-5 neutral overcurrent relays that had an inverse time characteristic with a fixed time characteristic Basler BE1-50/51B-219 relays. (complete)
- Replace or change the settings of the thermal overloads for W-1883B "G-03 EDG Room Small Capacity Exhaust Fan," and W-184B "G-04 EDG Room Large Capacity Exhaust Fan." (in progress)
- Change the long time breaker setting for 2B52-27A feeding 2P-014B "Containment Spray Pump B." (in progress)

INSPECTION RESULTS

Observation: Detection, Alarms, and General Criteria	2515/194

a. Detection, Alarms and General Criteria

(1) The inspector determined by walkdowns and observation that open phase conditions will be detected and alarmed in the control room for each unit. The "Open Phase Detected" alarms will notify operations of a possible open phase condition. The "Open Phase Trouble" alarms will notify operations of issues with the OPDP cabinets and equipment.

(2) Calculation 0292-0056-CALC-006 analyzed all applicable open phase conditions. Based on this calculation, Point Beach Nuclear Plant determined that the OPDS can identify open phase conditions under all operating electrical system configurations and plant transformer loading conditions. The licensee pointed out that the Point Beach Nuclear Plant electrical system did not employ a standby unloaded transformer.

(3) At Point Beach Nuclear Plant, the OPDS was installed to detect all applicable open phases and provide an alarm in the Control Room. The OPDS was not relied upon to provide system or transformer protection, the OPDS circuit was not tied-in to the station's transformers trip/lockout circuits. Protection was accomplished using the existing station protective schemes (degraded voltage relays, loss of voltage relays, and transformer neutral current relays). Calculation 0292-0056-CALC-005 demonstrated that existing protective schemes provided protection to safety related equipment for applicable open phase conditions or that the amount of unbalance is tolerable, without equipment damage, for an amount of time that would allow for identification via OPDS or periodic switchyard rounds.

(4) No Class-1E circuits were replaced with non-Class 1E circuits in the design.

(5) The licensee installed the OPDS via several Engineering Changes (EC). Implementation of the open phase detection system, which includes final alarm settings, replacing the neutral overcurrent relays and updating the station design and licensing bases is being accomplished via EC 291314. This EC is still in progress and therefore, the station's Updated Final Safety Analysis Report (UFSAR) has not been updated yet. The UFSAR change will be driven by and tracked through the modification closeout process.

No findings were identified.

Observation: Protective Actions Criteria	2515/194

b. Protective Actions Criteria

(1) The licensee determined Point Beach Nuclear Plant was susceptible to an open phase condition and implemented design changes to detect all applicable open phases and provided an alarm in the Control Room. The OPDS was not relied upon to provide system or transformer protection. Protection was accomplished using the existing station protective schemes (degraded voltage relays, loss of voltage relays, and transformer neutral current relays).

(2) Licensee's Calculation 0292-0056-CALC-005 documented a large number of parametric OPC analyses and demonstrated that most postulated OPCs were detectable by existing protective relays (i.e. LOV, DVR and 51N Relays). The severity of the detectable OPCs may result in moderate safety bus voltage unbalance that are tolerable for indefinite operation. Therefore, the licensee concluded that with OPC occurrence and no accident condition signal present, an OPC does no adversely affect the function of important-to-safety SSCs. In addition, see Item 2 in table titled "Protective Actions Criteria Exceptions" for inspector's identified exceptions.

(3) At Point Beach Nuclear Plant, the OPDS was installed to detect all open phase conditions and provide an alarm in the control room. The OPDS was not relied upon to provide system or transformer protection. Calculation 0292-0056-CALC-005 demonstrated that the existing Class-1E and non-Class-1E protective schemes provided protection to safety related equipment for applicable open phase conditions or that the amount of unbalance is tolerable, without equipment damage, for an amount of time that would allow for identification via OPDS or periodic operator switchyard rounds. Therefore, the licensee concluded that existing protective schemes will provide adequate automatic detection and actuation and will transfer loads required to mitigate postulated accidents to an alternate source and ensure that safety functions are preserved, as required by the current licensing bases.

(4) As demonstrated in Calculation 0292-0056-CALC-005, the existing Class-1E and no-Class-1E protective schemes provided protection to safety related equipment for all applicable open phase conditions. As such, periodic tests and Technical Specifications surveillances were already in place for the existing protective features. No surveillance requirements for the new OPDS equipment were added to the plant Technical Specifications.

No findings were identified.

Observation: Protective Actions Criteria Exceptions	2515/194

(2) The inspector noticed that the result of Calculation 0292-0056-CALC-005 indicated under a non-accident condition with an ungrounded double open phase condition, there was a potential for safety related motors to trip on overcurrent prior to actuation of the degraded voltage relays when grid voltage is greater than 359 KV and no safety injection signal is present. As a response to the inspector's question regarding this condition, the licensee indicated that at the time of completion of Calculation 0292-0056-CALC-005, this condition was determined to be acceptable because there would be sufficient time for plant operators to manually re-start the loads after the EDG has re-powered the bus. However, after review of the operations procedures and the modification for the OPC, the inspector did not identify any actions in the procedures or any procedure changes tracking items to re-start these loads. The licensee entered the inspector's concern into their Corrective Actions Program as AR 02333726.

EXIT MEETINGS AND DEBRIEFS

The inspector verified no proprietary information was retained or documented in this report.

- On October 30, 2019, the inspector presented the NRC Inspection of Temporary Instruction 2515/194, Inspection of The Licensee's Implementation of Industry Initiative Associated With The Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01) results to James Wilson, Operations Director and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	0292-0056-CALC-001	High Voltage Station Auxiliary Transformer Model Validation	1
		0292-0056-CALC-002	Low Voltage Station Auxiliary Transformer Model Validation	1
		0292-0056-CALC-003	Main Power Transformer Validation	1
		0292-0056-CALC-005	Point Beach Nuclear Plant Open Phase Analysis Results	0
	Corrective Action Documents Resulting from Inspection	AR - 02333726	Track Update for EC 291314	10/31/2019
	Drawings	E-2061 Sheet 3	Schematic Diagram 345 KV Breaker Control	8
		E-61 Sheet 4	Schematic Diagram Unit 1 Turbine Generator Control	10
		TD-4156-E	Schematic Diagram High Voltage Station Auxiliary Transformer 1X03	40
		TD-4158-E	Schematic Diagram High Voltage Station Auxiliary Transformer 2X03	33
	Engineering Changes	292779	Design Equivalent Change Package for 2B52-27A, 1B52-401B, 2B52-401B Overload Protection	0
		EC 291314	Implementation of Open Phase Detection System	5
	Miscellaneous	FSAR Section 8.0	Introduction to the Electrical Distribution Systems	2018